

Notice of Allowability

Application No.

10/609,294

Examiner

Tuan N. Nguyen

Applicant(s)

KLEM, JOHN F.

Art Unit

2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 06/26/2003.
2. ☒ The allowed claim(s) is/are 1-23.
3. ☒ The drawings filed on 26 June 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 06/26/2003
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

ALLOWANCE

Allowable Subject Matter

1. The following is an examiner's statement of reasons for allowance - with respect to claims 1, 12 and 21, the references of the record fail to teach or suggest:

Claim 1:

A distributed Bragg reflector exhibiting high reflectivity for photons of a predetermined energy E and axis, said reflector comprising a stacked plurality of repeat units, each *repeat unit* comprising a high-index layer, a first interlayer atop said high-index layer, a low-index layer atop said first interlayer, and a second interlayer atop said low-index layer, wherein:

a) said *high-index layer* is composed essentially of a first material having a first conduction band energy E_c^1 , a first valence band energy E_v^1 and first electronic bandgap E_b^1 where electronic bandgap of E_b^1 is greater than predetermined energy E ;

b) said *low-index layer* is composed essentially of a second material having a second index of refraction which is smaller than said first index of refraction, a second conduction band energy E_c^2 , a second valence E_v^2 and a second electronic bandgap E_b^2 , where said second electronic band E_b^2 being greater than the predetermined energy E ;

c) said *first interlayer* has a thickness along said predetermined propagation axis not greater than about 10 nanometers, and is composed essentially of a first interlayer material which is characterized by a first interlayer conduction band energy E_c^{IL1} and a first interlayer valence band energy E_v^{IL1} , the energies $E_c^{IL1} - E_v^{IL1}$, $E_c^{IL1} - E_v^1$, $E_c^1 - E_v^{IL1}$, $E_c^{IL1} - E_v^2$, $E_c^2 - E_v^{IL1}$ all being greater than said predetermined energy E ;

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d) said *second interlayer* has a thickness along said predetermined propagation axis not greater than *about 10 nanometers*, and is composed essentially of a second interlayer material which is characterized by a second interlayer E_c^{IL2} and a *second interlayer valence band energy* E_v^{IL2} , the energies $E_c^{IL2} - E_v^{IL2}$, $E_c^{IL2} - E_v^1$, $E_c^1 - E_v^{IL2}$, $E_c^{IL2} - E_v^2$, and $E_c^2 - E_v^{IL2}$ all being greater than said predetermined energy E .

Claim 12:

A distributed Bragg reflector for use at a wavelength near 1.55 μm , comprising a stacked plurality of repeat units with each *repeat unit having an optical thickness* substantially equal to *one-half of the wavelength* near 1.55 μm , and with each repeat unit comprising a *high-index layer* consisting essentially of *aluminum gallium arsenide antimonide (AlGaAsSb)*; a first interlayer adjacent the high-index layer; a *low-index layer* consisting essentially of *indium phosphide (InP)* adjacent the first interlayer; and a *second interlayer* adjacent the low-index layer, and with the first and second interlayers each having an energy bandgap greater than 0.82 eV and each acting to substantially prevent optical absorption in the distributed Bragg reflector from spatially indirect photon-assisted transitions between the high-index and low-index layers therein.

Claim 21:

A distributed Bragg reflector with wavelength near 1.55 μm comprising a plurality of alternating high-index and low-index layers, where *high-index layers* comprising $\text{Al}_{0.1}\text{Ga}_{0.9}\text{As}_{0.52}\text{Sb}_{0.48}$ and the *low-index layers* comprising InP; and an interlayer comprising $\text{AlAs}_{0.56}\text{Sb}_{0.44}$ or $\text{Al}_x\text{Ga}_{1-x}\text{As}_{1-y}\text{Sb}_y$ with $0.89 < x < 1.0$ and with $0.44 < y < 0.445$ located between

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each adjacent pair of high-index and low-index layers, by having the exact value of y in this range will provide interlayer a substantial lattice-matching to InP similar with $\text{Al}_{0.1}\text{Ga}_{0.9}\text{As}_{0.52}\text{Sb}_{0.48}$.

3. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

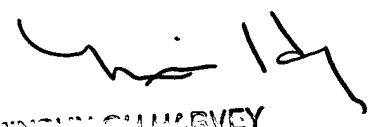
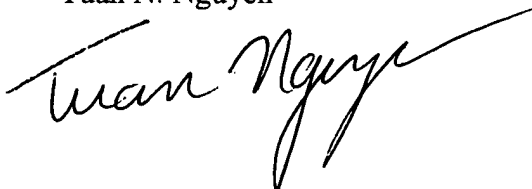
Communication Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan N Nguyen whose telephone number is (571) 272-1948. The examiner can normally be reached on M-F: 7:30 - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harvey Minsun can be reached on (703) 308-16741. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tuan N. Nguyen



TUAN N. NGUYEN
PRIMARY EXAMINER